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IS 8930-2 (2001): Technical Product Documentation -
Vocabulary, Part 2: Terms Relating to Projection Methods
[PGD 24: Drawings]



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“Knowledge is such a treasure which cannot be stolen”

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भारतीय मानक

उत्पादों का तकनीकी प्रलेखन — शब्दावली

भाग 2 प्रक्षेपण पद्धति से संबंधित पारिभाषिक शब्द

Indian Standard

TECHNICAL PRODUCT
DOCUMENTATION — VOCABULARY

PART 2 TERMS RELATING TO PROJECTION METHODS

ICS 01.100

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NATIONAL FOREWORD

This Indian Standard (Part 2) which is identical with ISO 10209-2 : 1993 'Technical product documentation—Vocabulary—Part 2 : Terms relating to projection methods', issued by the International Organization for Standardization (ISO) was adopted by the Bureau of Indian Standards on the recommendation of Drawings Sectional Committee and approval of the Basic and Production Engineering Division Council.

ISO 10209-1 was published in 1992 and was accordingly adopted as IS 8930 (Part 1) : 1995. Now ISO has published ISO 10209-2 : 1993. In view of the above, the committee decided to adopt ISO 10209 – 2 : 1993. This standard (Part 2) establishes and defines terms relating to projection methods used in technical product documentation covering all fields of application. Other part of this series is given as follows:

IS 8930 (Part 1) : 1995 Technical product documentation—Vocabulary : Part 1 Terms relating to technical drawings : General and types of drawings (*first revision*)

The text of ISO standard has been approved as suitable for publication as Indian Standard without deviations. In this adopted standard, certain terminology and conventions are not identical to those used in Indian Standards. Attention is particularly drawn to the following:

- a) Wherever the words 'International Standard' appear referring to this standard, they should be read as 'Indian Standard'.
- b) Comma (,) has been used as a decimal marker while in Indian Standards the current practice is to use a full point (.) as the decimal marker.
- c) Only the English language text of the International Standard has been retained while adopting it in this Indian Standard.
- d) Equivalent terms in French, German, Italian and Swedish as given in the ISO Standard have not been included. Thus Note 2 under the Scope and Annex A of this International Standard have been deleted while adopting it as Indian Standard.

In this adopted standard, reference appears to certain International Standards for which Indian Standards also exist. The corresponding Indian Standards which are to be substituted in their place are listed below along with their degree of equivalence for the editions indicated :

<i>International Standard</i>	<i>Corresponding Indian Standard</i>	<i>Degree of Equivalence</i>
ISO 5456-2 : 1996	IS 15021 (Part 2) : 2001 Technical drawings — Projection methods: Part 2 Orthographic representations	Identical
ISO 5456-3 : 1996	IS 15021 (Part 3) : 2001 Technical drawings — Projection methods : Part 3 Axonometric representations	do
ISO 5456-4 : 1996	IS 15021 (Part 4) : 2001 Technical drawings — Projection methods: Part 4 Central projection	do

Indian Standard

TECHNICAL PRODUCT DOCUMENTATION—VOCABULARY

PART 2 TERMS RELATING TO PROJECTION METHODS

1 Scope

This part of ISO 10209 establishes and defines terms relating to projection methods used in technical product documentation covering all fields of application.

NOTE 1 Terms which are defined elsewhere in this part of ISO 10209 are shown in *italics*.

2 Normatives references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 10209. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 10209 are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 5456-2:-¹⁾, *Technical drawings — Projection methods—Part 2: Orthographic representations.*

ISO 5456-3:-¹⁾, *Technical drawings — Projection methods — Part 3: Axonometric representations.*

ISO 5456-4:-¹⁾, *Technical drawings—Projection methods — Part 4: Central projection.*

3 Terms relating to projection methods (see also table 1)

3.1 representation: Presentation of drawn information relating to any type of technical drawing. Generally either referred to a *particular projection method*, or a diagram.

3.2 coordinate system: Basis for establishing a relationship between each point in space and the three corresponding coordinates and vice versa.

NOTE 2 The term is often used to denote *rectangular coordinate system*.

3.3 coordinates: Set of numerical ordered values (and their corresponding units of measure), giving unequivocally the position of a point in a *coördiante system*.

NOTE 3 The term is often used to denote *rectangular coordinates*.

1) To be published.

3.4 coordinate axes: Three reference straight lines in space which intersect at the point of *origin*, thus forming a *coordinate system*.

NOTE 4 The term is often used to denote *rectangular coordinate axes*.

3.5 coordinate plane: Each of the three planes defined by any two of the *coordinate axes*.

NOTE 5 The term is often used to denote *rectangular coordinate plane*.

3.6 origin : Point of intersection of the *coordinate axes*.

3.7 rectangular coordinate system : *Coördiante system* based on a reference system given by three mutually orthogonal axes (*rectangular coordinate axes*), originating from the same point (*origin*), and their units of measure.

NOTE 6 Normally referred to simply as *coordinate system*.

3.8 rectangular coordinates: The three rectangular coordinates of a point in space relative to a *rectangle coordinate system* are the distances of the point from the *coordinate planes*, in a given order.

NOTE 7 Normally referred to simply as *coordinates*.

3.9 rectangular coordinate axes: *Coordinate axes* intersecting at right angles.

NOTE 8 Normally referred to simply as *coordinates axes*.

3.10 rectangular coordinate planes: *Coordinate planes* intersecting at right angles.

NOTE 9 Normally referred to simply as *coordinates planes*.

3.11 polar coordinate system: *Coordinate system* based on a reference system given by a *polar coordinate axis* and its units of measure.

3.12 polar coordinates: The three coordinates of a point in space relative to a *polar coordinate system*; they are :

the radius, (distance between the point and the *origin*),

the azimuth (angle formed by the vertical plane passing through the point and the origin, and the *polar coordinate axis*), and

the angular height (angle formed by the horizontal plane passing through the origin and the straight line passing through the point and the origin).

3.13 polar coordinate axis: Horizontally oriented straight line and its *origin*.

3.14 cylindrical coordinate system: *Coordinate system* based on a reference system given by a reference horizontally oriented straight line and its *origin* and units of measure.

3.15 cylindrical coordinates: The three coordinates of a point in space relative to a *cylindrical coordinate system*; they are:

the radius (distance of the point from the vertical axis passing through the origin),

the azimuth (angle formed by the vertical plane passing through the point and the origin, and the reference horizontal oriented straight line), and

the height (distance of the point from the horizontal plane passing through the origin).

3.16 projection method: Rules used to obtain a two-dimensional image of a three-dimensional object. It implies the choice of the *projection centre* and of the *projection plane*.

3.17 projection centre: Point from which all *projection lines* originate.

3.18 projection plane: Plane on which the object is projected in order to obtain a *representation* of that object.

3.19 projection line; projector: Straight line originating from the *projection centre* and passing through a point on the object to be represented. Its intersection with the *projection plane* gives the image of that point of the object.

3.20 parallel projection: *Projection method* in which the *projection centre* is placed at an infinite distance, and all *projection lines* are parallel.

3.21 central projection: *Projection method* in which the *projection centre* is placed at a finite distance, and all *projection lines* are converging.

3.22 orthogonal projection: *Parallel projection* in which all *projection lines* intersect the *projection plane* at right angles.

3.23 oblique projection: *Parallel projection* in which all *projection lines* intersect the *projection plane* at the same angle other than 90° .

3.24 orthographic representation: *Orthogonal projections* of an object normally positioned with

its main faces parallel to the *coordinates planes* on one or more *projection planes* coincident with or parallel to the coordinate planes. These projection planes are to be conveniently rotated on the drawing sheet, so that the views of the object are positioned systematically relative to each other.

3.25 first angle projection: *Orthographic representation* comprising the arrangement, around the principal view of an object, of some or all of the other five views of that object. With reference to the principal view, the other views are arranged as follows:

- the view from above is placed underneath,
- the view from below is placed above,
- the view from the left is placed on the right,
- the view from the right is placed on the left,
- the view from the rear is placed on the left or on the right, as convenient.

3.26 third angle projection: *Orthographic representation* comprising the arrangement, around the principal view of an object, of some or all of the other five views of that object. With reference to the principal view, the other views are arranged as follows:

- the view from above is placed above,
- the view from below is placed underneath,
- the view from the left is placed on the left,
- the view from the right is placed on the right,
- the view from the rear is placed on the left or on the right, as convenient.

3.27 reference arrow layout: *Representation* in which views and sections are freely positioned in the drawing. Each view and section is identified with a capital letter repeated near the arrow indicating the direction of viewing in the principal view.

3.28 topographical projection: *Orthogonal projection* on a horizontal *projection plane* of the intersections of a series of equidistant horizontal planes with the surface to be represented. Each intersection is shown by a *level contour line* indicating the level of the intersection with respect to a reference horizontal level.

3.29 level contour line: In a *topographical projection*, intersection of the horizontal plane at a predetermined level above or below a reference level with the surface to be represented.

NOTE 10 The level contour line is annotated with a single or repeated number giving the relevant level in the proper unit of measure.

3.30 pictorial representation: Technical or artistic bi-dimensional presentation of objects giving a realistic view.

NOTE 11 In the field of technical drawings, axonometric and perspective representations, as well as *X-ray* and *exploded views*, are considered pictorial representations.

3.31 X-ray view: *Pictorial representation*, normally in *perspective*, showing complex objects as if they were partially transparent, in order to reveal their main parts.

3.32 exploded view: *Pictorial representation* of an assembly, usually in *isometric axonometry* or *perspective representation*, in which components are drawn to the same scale and correctly oriented relative to each other, but are separated from each other in their correct sequence along common axes.

3.33 axonometric representation: *Parallel projection* of an object on a single *projection plane*.

3.34 orthogonal axonometry: *Orthogonal projection* on a single *projection plane*.

3.35 oblique axonometry: *Oblique projection* on a single *projection plane*.

3.36 monometric projection: *Axonometric representation* in which all three scales on all three *third coordinate axes* are identical.

3.37 dimetric projection: *Axonometric representation* in which the scales of two *coordinate axes* are identical, with a different scale on the *coordinate axis*.

3.38 trimetric projection: *Axonometric representation* in which the scales are different on all the three *coordinate axes*.

NOTE 12 This method is not recommended.

3.39 isometric axonometry: *Orthogonal axonometry* in which any *projection line* forms three equal angles with respect to the *coordinate axes*. The *projection plane* intersects the *coordinate axes* at equal angles and therefore the scales on all three axes are identical (*monometric projection*).

3.40 cavalier axonometry: *Oblique axonometry* in which the *projection plane* is parallel to one of the *coordinate planes*. The dimensions of the features of the object lying on the face parallel to the *projection plane* are represented in the same scale. By convention, the projection along the third axis is also in the same scale (*monometric projection*).

3.41 cabinet axonometry: *Oblique axonometry* in which the *projection plane* is parallel to one of the *coordinate planes*. The dimensions of the features of the object lying on the face parallel to the *projection plane* are represented in the same

scale. By convention, the projection along the third axis is reduced by a factor of two.

3.42 planometric axonometry: *Oblique axonometry* in which the *projection plane* is parallel to the horizontal *coordinate plane*.

3.43 perspective representation: *Central projection* of an object on a *projection plane* (normally vertical).

3.44 vanishing point: Point at which converging lines meet when representing parallel straight lines in *perspective representation*. It is the image of the point at infinite distance of all parallel straight lines.

3.45 one-point perspective: *Perspective representation* of an object placed with one of its faces parallel to the *projection plane*.

3.46 bird's eye perspective: *One-point perspective*, seen from above on a horizontal *projection plane*.

3.47 frog's eye perspective: *One-point perspective*, seen from beneath on a horizontal *projection plane*.

3.48 two-point perspective: *Perspective representation* of an object placed with its vertical faces inclined to and its horizontal faces at right angles to the vertical *projection plane*.

3.49 three-point perspective: *Perspective representation* of an object having all its faces inclined to the *projection plane*.

3.50 basic plane: Horizontal plane parallel to the *main projection line* on which the viewer stands (monocular vision).

3.51 basic line: Intersection between the *projection plane* and the *basic plane*.

3.52 horizon plane: Horizontal plane passing through the *projection centre*.

3.53 horizon line: Intersection between the *horizon plane* and the vertical *projection plane*. It is the geometric location of the *vanishing points* of all horizontal straight lines.

3.54 main point: Intersection between the *main projection line* and the *projection plane*. It is the *vanishing point* of all the straight lines orthogonal to the *projection plane* (depth lines).

3.55 main projection line: Horizontal *projection line* passing through the *projection centre* and intersecting the vertical *projection plane* at right angles to the main point.

3.56 point view: Projection of the *projection centre* on the *basic plane*.

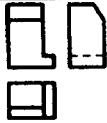
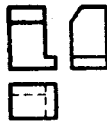
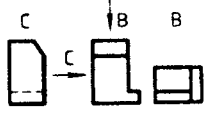






3.57 vision cone: Right circular cone having the *main projection line* as its axis and the *projection centre* as vertex.

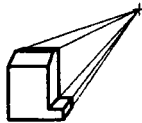
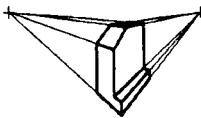
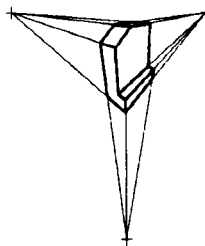
3.58 vision angle: Angle of aperture of the *vision cone*.

3.59 circle of vision: Trace of the *vision cone* on the *projection plane*.

3.60 distance point: Each of the two *vanishing points* of all parallel horizontal lines inclined at 45° to the *projection plane*.

Table 1— Summary of recommended representation methods for technical drawings

Location of projection centre	Position of projection plane	Position of main features of object	Resulting representation method		Example	Reference
			term	defined in		
Infinite (parallel projection lines)	Orthographic projection					
	Parallel/orthogonal to coordinate axes and orthogonal to projection lines	Normally parallel/orthogonal to projection planes and to coordinate planes	First angle	3.25		ISO 5456-2 :— ¹⁾ , 5.1
			Third angle	3.26		ISO 5456-2 :— ¹⁾ , 5.2
			Reference arrows	3.27		ISO 5456-2 :— ¹⁾ , 5.3
		No main feature	Topographic-al projection	3.28		—
	Axonometric projection					
	Equally inclined to the coordinate axes and orthogonal to projection lines	Parallel to coordinate planes	Isometric	3.39		ISO 5456-3 :— ¹⁾ , 5.1
	Equally inclined to two of the coordinate axes and orthogonal to projection lines		Dimetric	3.37		ISO 5456-3 :— ¹⁾ , 5.2
	Differently inclined to the coordinate axes and orthogonal to projection lines		Trimetric	3.38	Not recommended	—
	Parallel to a vertical coordinate plane and oblique to projection lines	Parallel to vertical projection plane	Cavalier	3.40		ISO 5456-3 :— ¹⁾ , 5.3.1
			Cabinet	3.41		ISO 5456-3 :— ¹⁾ , 5.3.2
	Parallel to the horizontal coordinate plane and oblique to projection lines	Parallel to horizontal projection Plane	Planometric	3.42		ISO 5456-3 :— ¹⁾ , 5.3.3

Location of projection centre	Position of projection plane	Position of main features of object	Resulting representation method		Example	Reference
			term	defined		
Finite (divergent projection lines)	Central projection					
	Normally vertical	Face parallel to projection plane	One-point perspective	3.45		ISO 5456-4:— ¹⁾ , 4.1
		Edge parallel to projection plane	Two-point perspective	3.48		ISO 5456-4:— ¹⁾ , 4.2
		Oblique to projection plane	Three-point perspective	3.49		ISO 5456-4:— ¹⁾ , 4.3

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This Indian Standard has been developed from Doc : No. BP 24 (0155).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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